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The Southeast Flank of the Anticlinorium

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ROAD LOG, TRIP AS$_2$

THE SOUTHEAST FLANK OF THE ANTICLINORIUM

By Robert B. Neuman, Leader

Topographic quadrangle maps:

15-minute	2-degree
Shin Pond	Millinocket
Island Falls	
Sherman	
Stacyville	

Assemble in front of Shin Pond House, Shin Pond, Maine, ready for departure at 8:00 A.M., Saturday, October 1. Admonitions of the Friday trip apply to this one as well.

Mileage

0.0 Shin Pond House, facing south.

0.2 Thoroughfare between Upper and Lower Shin Ponds.

0.4 STOP 1. Roadside ledge on right is breccia consisting of fragments of greenstone and Grand Pitch quartzite which are xenoliths in porphyritic quartz diorite.

0.7 Roadside ledge on left is especially coarse-grained porphyritic quartz diorite that contains a few greenstone xenoliths.

2.1 Roadside ledge on left opposite cabin is Silurian conglomerate containing flattened and elongated pebbles; elongation is vertical.

2.8 STOP 2. "The Last Resort." Ledges in the field on the west side of the road, south of the farmhouse include cobble conglomerate containing fragments of porphyritic quartz diorite, mafic and felsic volcanic rocks, and quartzite. The rock here is considerably more deformed than it is farther southwest in this fault block, but this is the most accessible exposure.

3.3 STOP 3. Roadside ledge on right contains southeast-facing sets of graded, coarse-grained sandstone and slate representative of the lower, coarse-grained part of the Silurian sequence on the southeast flank of the anticlinorium. Note refracted cleavage and lineation formed by the intersection of bedding and cleavage.

3.4 Allsbury Road; turn left.

4.1 STOP 4. Valley of Peasley Brook. At or immediately beneath the roadbed on both sides of the brook are exposures of sandstone, siltstone, and slate that will be the type section of a formation to be named after this road in the report on the Island Falls quadrangle by Ekren and Frischknecht. Because the road is alternately gravelled and washed out, it is impossible to determine in advance which part of the sequence will be available for inspection. Parts of the section are predominantly gray sandstone and siltstone with minor amounts of dark-gray slate, and other parts are largely dark-gray sulfidic slate. The latter are conductive to small electrical currents and were distinguished electromagnetically by Ekren and Frischknecht. Such rock contains graptolites in a few places where bedding and cleavage are parallel.

7.0 Ledges on right are dark sulfidic slate.

8.1 Maine Highway 11; turn right.

11.3 Ledge on right is black sulfidic slate; on left in field is sandstone and conglomerate.

12.4 Entering Patten; go straight through town on Maine 11.

13.3 Fish Stream. About ½ mile upstream (west) is black slate that has yielded the most abundant monograptid graptolites from this part of the sequence.

13.7 Leaving Patten.

16.2 Happy Corners Road; keep straight on Maine 11.

17.2 STOP 5. Hilltop with hotdog stand and view. To the west, valley of the East Branch of the Penobscot River, Mt. Katahdin, and Traveler Mountain. The near wooded ridge is supported by the lower sandy part of the Silurian sequence, and in the middle ground are the bare ledges of Ordovician volcanic rocks on Lunksoos Mountain.

21.6 Bangor and Aroostook Railroad at Sherman Station.

23.8 Roadcut on right is gray slate and thin-bedded, fine-grained limestone, probably a part of the Silurian succession, but the Sherman quadrangle has not been mapped.

24.5 Turn right following Maine 11.

25.8 Roadcuts to left are tightly folded gray slate and siltstone.

26.2 A few trace fossils (nereitids) from these exposures are like those associated with Silurian graptolites at Waterville to the southwest, and at Dyer Brook to the northeast and thus suggest the Silurian age of these rocks.

27.1 Siberia; Bangor and Aroostook Railroad.

30.1 Stacyville Post Office.

30.6 Route 11 turns sharp left; go straight ahead on unpaved road.

31.1 Swift Brook; sawmill.

35.6 Road forks; go left. Right fork goes to the site of Hunt Farm where 130 years ago Charles T. Jackson was lodged.

38.4 STOP 6. East Branch of the Penobscot River at Whetstone Falls. Rock is gray slate and thin-bedded fine-grained sandstone assigned to the same formation as that examined at Allsbury Road. Note the steeply plunging folds; note also that the thickness of sandstone layers and offset along cleavage surfaces are proportional; dislocations of the thicker sandstones are greater than those of the thinner ones and barely visible in laminated slate. This is the western edge of the belt of fine-grained Silurian rocks; the western boundary is thought to be a strike-slip fault whose trace is buried beneath the alluvium in the East Branch.
Cross river on bridge.

38.7 Turn right.

39.9 Bridge over Sandbank Stream.

42.1 STOP 7. Ordovician chert at bridge over Wassataquoik Stream (fig. 5). The ledges along the south bank of the stream both east and west of the bridge are thin-bedded gray and green chert with thin partings of siliceous slate; these rocks are included in a formation to be named after this stream. Graptolites were first collected here by Dodge in 1881, and later by E. S. C. Smith. We have found only fragmentary specimens here, and they occur in the slaty partings. In addition, a slate layer about 200 feet downstream from the bridge has yielded conodonts.

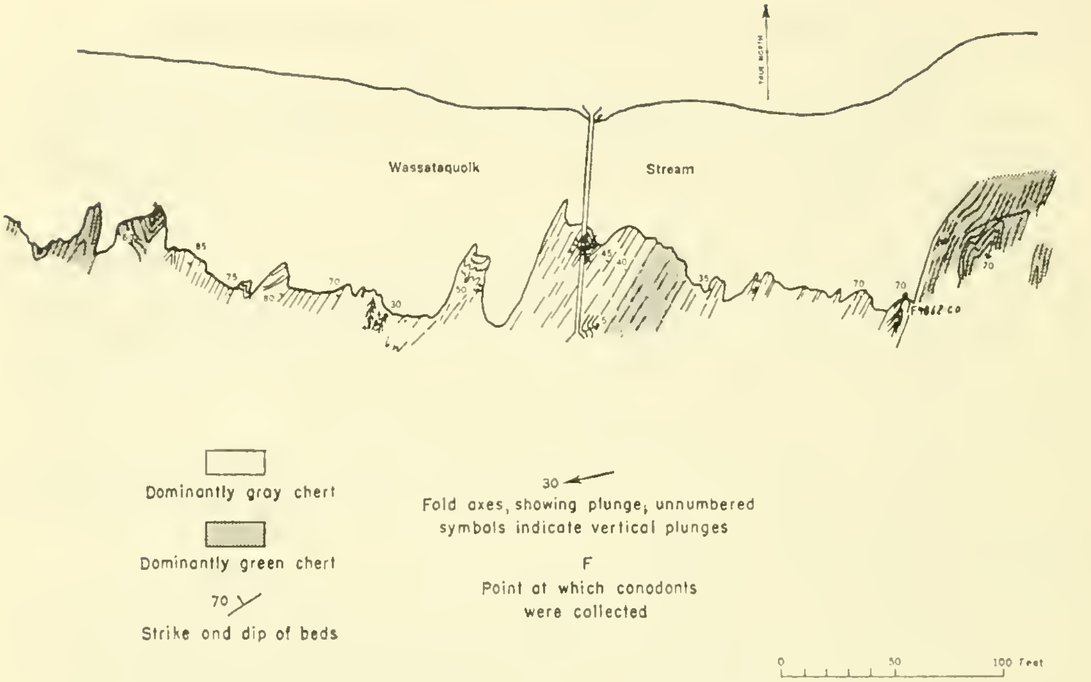

Figure 5. Sketch map of the exposures of Ordovician chert at the bridge over Wassataquoik Stream about one mile northwest of its mouth, Stacyville quadrangle

The beds are thrown into intricate, steeply plunging folds. Because these rocks contain no positive top criteria, the stratigraphic succession within the exposure remains equivocal. From relations elsewhere it seems likely that the chert overlies the unit of mafic volcanic rocks (greenstone) such as that at Stop 9.

Cross bridge and continue northward along this road (approximately the Telos Tote Road of the topographic map).

44.3 Bridge over Owen Brook; cross bridge and turn into first woods road on right

STOP 8. Upper Silurian high-calcium limestone. Follow logging road about 2,000 feet to third road branching right (east), then about 1,000 feet to ledges. Several kinds of limestone are present, including some that is medium to light gray and fine grained, some light-gray calcarenite, and some that is breccia in which red staining is conspicuous. Stromatoporoids, colonial and rugose corals are common, and the large brachiopod *Conchidium* has been collected here. Both the corals and the brachiopod indicate that the limestone is of Late Silurian (early Ludlow) age.

Bedding is obscure in most places, but where seen it strikes northwest. The limestone is strongly fractured or cleaved. The rocks surrounding the limestone are of several different kinds; thus the limestone is considered to be a fault block, a part of the fault complex on the southeast flank of the anticlinorium.

Until about 20 years ago erratics derived from this limestone stimulated prospecting as far south as Wassataquoik Stream, but the ledges themselves were not found until we came across them in the course of geologic mapping in 1963. Limestone is an essential ingredient in the older pulp-making process, and for many years the Great Northern Paper Company brought it to Millinocket from Union, 125 miles away. The modernized plant, 12 miles from here, no longer uses limestone, but the deposit may have potential for other chemical, agricultural, and construction uses.

Turn around and return to junction just west of Whetstone Falls.

49.9 Turn right (west); road approximately follows Sandbank Trail of topographic map.

50.2 Bridge over Sandbank Stream.

52.5 Road forks; keep right (road left goes to Millinocket).

52.9 Road forks; keep right.

55.2 STOP 9. Ordovician mafic volcanic rocks (greenstone) at big bend of Wassataquoik Stream. Please do not go beyond the waterside ledges just below the bend.

Although the origin of the Ordovician greenstones is obscure at most places, here and at a few other places it is plainly a pillow lava. Pillows range from 1 to 3 feet in average diameter; their rounded surfaces are weathered out throughout these exposures, and cross sections of them can be seen along the river bank. In section, their central parts are coarser grained than their margins, and they are outlined by green, epidote-rich selvages. Some are concentrated in vertically standing layers and are defined by stratified rock—either tuff or reworked weathering products. Downward-facing necks are present but rare; tops have been determined from them and other features. Perhaps the field trip participants will confirm our conclusions on this.

Turn around and return to last major road forks.

57.5 Road junction; turn right.

58.5 STOP 10. Turn out at crest of hill where road turns right. Border breccia of the quartz monzonite of Mount Katahdin. The large drift boulders by the roadside are good samples of this rock, affording 3-dimensional views of its structures without moss cover. To reach ledges, go about 750 feet north of turn in road to first rise, then right (east) into the woods 900 feet to top of hill, 1,020 feet. Xenoliths include thin-bedded metaquartzite, "gneiss" or "granulite" containing abundant biotite and reflecting original graded bedding. Xenoliths are folded; some have abrupt boundaries with enclosing fine-grained granitic matrix, and these commonly have pronounced reaction rims. Other boundaries are vague, indicating that the xenoliths are partly assimilated into the matrix.

The attitude of the xenoliths seems chaotic, as strikes and dips in all directions can be found; most dips, however, are gentle.

There are no accessible exposures of the granoblastic phase of the quartz monzonite in this area. The many large drift boulders are excellent samples of this rock, and it is exposed at the top of Wassataquoik Mountain, ½ mile to the northwest.

RETURN TO SHIN POND FOR BARBECUE AT MOUNT CHASE LODGE

QUARTZ LATITE OF TRAVELER MOUNTAIN[1]

By Douglas W. Rankin

The quartz latite of Traveler Mountain is the northeasternmost and by far the largest of a discontinuous belt of equivalent Lower Devonian felsic volcanic rocks in northern Maine (Boucot and others, 1964). It is of interest because of its size, its situation in a geosynclinal environment, and its interpreted volcanic history.

The quartz latite occupies a structurally depressed, roughly quadrilateral area on the northwest limb of the Weeksboro-Lunksoos Lake Anticline. It is bounded by high-angle faults on its north and west sides and intruded by the quartz monzonite of Mt. Katahdin on its south side. The present outcrop area of the quartz latite within this structural depression measures about 8 by 12 miles, and its maximum thickness is at least 10,000 feet. Taking the average thickness to be 5,000 feet, the volume of quartz latite within the structural depression is on the order of 80 cubic miles. It is, therefore, one of the largest bodies of felsite in the United States, if not the world. The depression is thought to be an ancient caldera.

Because interbedded sediments are rare and because no soil zones have been observed between any units, the quartz latite was probably erupted in a relatively short time. As ash flow sheets constitute a large part of the unit, most of it was probably erupted subaerially (Rankin, 1960).

In the field, the quartz latite is a monotonously homogeneous unit. The origin of some of the rocks, such as thinly bedded air-fall tuff, is obvious in outcrop, but, in general, thin sections are required to distinguish between rock types. Many rocks are sufficiently recrystallized so that even thin sections are of little help. Thus, although it is known that a certain outcrop consists of welded tuff, the extent of that particular ash-flow sheet, either laterally or vertically, is not known.

By a combination of field and petrographic studies, the quartz latite of Traveler Mountain has been divided into the two members (fig. 1 of Neuman and Rankin, this guidebook). A particular type of volcanic activity appears to have produced the bulk of each member. The percentage of quartz phenocrysts is the only consistent difference observable in the field between the two members. The significance of the quartz phenocryst content was recognized after completion of most of the fieldwork. Limited field checking has shown that the subdivision is a valid one; the contact between the two members is gradational in terms of the percentage of quartz phenocrysts present. It is, however, extremely difficult with a hand lens to recognize small quartz phenocrysts that constitute 5 percent or less of the rock. Over much of its length, the contact between the members is approximated between locations from which hand specimens were collected.

The lower member of the quartz latite is characterized by ash-flow tuffs containing quartz, plagioclase, and altered mafic phenocrysts. Typically, the member contains 15 percent phenocrysts, of which about one-third are quartz.

The upper member is characterized by lava containing plagioclase, clinopyroxene, and, in some rocks, biotite phenocrysts. Quartz phenocrysts are absent or sparse. Typically the lava contains 10 percent phenocrysts of which about 75 percent are plagioclase, 20 percent are clinopyroxene (and biotite) and 5 percent are magnetite. Growth aggregates of phenocrysts, rare in the ash-flow tuff of the lower member, are common in the lava of the upper member.

[1] Publication authorized by the director, U. S. Geological Survey